

CLAIMS

1. A method of determining a position of a mobile communication device in a mobile communication network including a plurality of base stations, comprising the steps of:
 - 5 dividing an area covered by the mobile communication network into a plurality of grids and collecting a first base station signal information with respect to each of the divided grids;
 - storing and maintaining the collected first base station signal information in association with position information of the grids in a database;
 - 10 measuring a second base station signal information received by the mobile communication device;
 - comparing the second base station signal information with the first base station signal information to find position information corresponding to the second base station signal information in the database; and
 - 15 generating final position information of the mobile communication device based on the position information found in the database.
2. The method of claim 1, wherein the first base station signal information includes at least one of pseudo-random noise phase, pseudo-random noise offset, 20 pseudo-random noise phase delay, and pseudo-random noise strength.
3. The method of claim 1, wherein the grids are three-dimensionally divided, the position information includes altitude information, and the first base station signal information varies with the altitude information.
- 25 4. The method of claim 3, wherein the altitude information is determined based on relative phase difference of the pseudo-random noise offsets with respect to the plurality of base stations.
- 30 5. The method of claim 1, further comprising the steps of:
 - determining second position information by a predetermined second position determination method;

measuring third base station signal information received by a second mobile communication device with respect to the second position information; and

5 updating the first base station signal information stored in the database based on the measured third base station signal information.

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6. The method of claim 5, wherein the second position determination method is performed by a GPS receiving device.

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7. The method of claim 5, wherein the updated first base station information (a') is determined according to $a' = w * a + (1 - w) * b$ (a: first base station information, b: third base station information, and $0 < w < 1$).

8. The method of claim 1, wherein the grids are divided according to the inside and outside of a building and a story of the building.

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9. The method of claim 1, wherein the grids are corresponding to each building and the position information includes identification information of the buildings.

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10. A method of determining a position of a mobile communication device based on a grid map database in a mobile communication network including a plurality of base stations, comprising the steps of:

measuring a second base station signal information received by the mobile communication device;

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comparing the second base station signal information with the first base station signal information to find position information corresponding to the second base station signal information in the grid map database; and

generating final position information of the mobile communication device based on the position information found in the grid map database,

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wherein, the grid map database stores first base station signal information in association with position information of grids and an area covered by the mobile communication network is divided into the grids.

11. A system for determining a position of a mobile communication device in a mobile communication network including a plurality of base stations, comprising:

a data collection unit dividing an area covered by the mobile communication network into a plurality of grids and collecting first base station signal information with respect to the divided grids;

5 a grid map database storing and maintaining the collected first base station signal information in association with the position information of the grid;

a signal measurement unit measuring second base station signal information received by the mobile communication device;

10 a position information search unit comparing the second base station signal information with the first base station signal information to find position information corresponding to the second base station signal information in the database; and

a position determination unit generating final position information of the mobile communication device based on the position information found in the database.

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12. The system of claim 11, wherein the position determination unit is installed in the mobile communication device.

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13. A method of determining a position of a building to which a mobile communication device belongs, comprising the steps of:

25 collecting first base station signal information with respect to each building;

storing and maintaining the collected first base station signal information in association with identification information of the buildings in a pattern matching database;

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measuring second base station signal information received by the mobile communication device;

searching the pattern matching database by the second base station signal information to find a base station set similar to the second base station signal information; and

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determining a position of a building corresponding to the found base station set as the position of the building to which the mobile communication device belongs in the case the property of the second base station signal information is corresponding to a

predetermined property range of the found base station set.

14. The method of claim 13, wherein the predetermined property range of the base station set includes a pseudo-random noise phase delay range and a pseudo-random noise strength range.

15. The method of claim 14, wherein:

the pseudo-random noise phase delay range is determined within a predetermined range including a minimum value and a maximum value of the pseudo-random noise phase delays of base stations in the base station set, and

the pseudo-random noise strength is determined within a predetermined range including a minimum value and a maximum value of the pseudo-random noise strengths of base stations in the base station set.

15 16. The method of claim 13, wherein the pattern matching database is updated by newly collected base station signal information and the updated base station signal information (a') is determined according to $a' = w * a + (1 - w) * b$ (a: existing base station information, b: newly collected base station information, and w is a weight more than 0 and less than 1).

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17. A system for determining a position of a building to which a mobile communication device belongs, comprising:

a data collection unit collecting first base station signal information with respect to each building;

25 a pattern matching database storing the collected first base station signal information in association with an address of the building;

a signal measurement unit measuring second base station signal information received by the mobile communication device;

30 a base station set search unit searching the pattern matching database by the second base station signal information to find a base station set similar to the second base station signal information; and

a position determination unit determining a position of a building

corresponding to the found base station set as the position of the building to which the mobile communication device belongs in the case the property of the second base station signal information is corresponding to a predetermined property range of the found base station set

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18. A computer readable recording medium in which a program for executing the method of any one of claims 1 to 9 and 13 to 16 is recorded.